

## Effect of Handpiece Lubricant on Bond Strengths (9/05)

Roberts HW, Vandewalle KS, Charlton DG, Leonard DL. Effect of handpiece maintenance method on bond strength. *Oper Dent* 2005;30:528-532.

Residual lubricants retained in the handpiece may be displaced onto the tooth surface. A few studies have examined the effect of contamination from handpiece lubrication oils on enamel and dentin bond strengths, but the results have been equivocal.<sup>1,2</sup> The purpose of this study was to evaluate the effect of dental-handpiece lubricant on dentinal shear bond strength. A lubrication-free handpiece (Star 430 SWL, DentalEZ Group, Lancaster, PA) and a handpiece requiring lubrication (W&H 98L, W&H DentalWerk, Burmoos, Austria) were used. The W&H handpiece was manually lubricated with the manufacturers aerosol cleaner/lubricant as recommended. Automatic lubrication of the W&H handpiece was accomplished using the Assistina Plus 301 Cleaning and Lubricating Unit (W&H DentalWerk). Extracted human molars were ground to expose a flat dentin surface. Six different handpiece combinations were used. A control consisted of no exposure of the dentin to handpiece lubricant. The lubrication-free handpiece without lubrication was used for the second combination. The third and fourth combination consisted of the handpiece that required lubrication to receive lubrication either manually or automatically prior to autoclaving. The fifth and sixth combination was similar to the third and fourth combination, except lubrication was also completed after autoclaving. The dentin was exposed for 30 seconds to water spray from the handpieces. Three different adhesives were used per handpiece combination for a total of 18 groups (six handpiece combinations x 3 adhesives) with ten specimens per group ( $n = 10$ ). A button of composite resin (Z100, 3M ESPE, St. Paul, MN) was bonded to the dentin surface with either a two-step, total etch (Single Bond, 3M ESPE), two-step, self-etch (Clearfil SE, Kuraray, New York, NY), or a one-step, self-etch (One-Up Bond F, J Morita, Irvine, CA) adhesive. The specimens were thermocycled and tested to failure in shear at seven days. Mean bond strength data were analyzed using Dunnetts multiple-comparison test ( $\alpha = 0.05$ ) and debonded surfaces were examined to determine failure mode. **There were no significant differences in bond strengths between the control and the handpiece combinations within each adhesive type. The authors concluded that neither handpiece lubrication nor maintenance method produced significant differences in dentinal shear bond strengths.**



**DECS Comment:** Bond strength may be affected by many factors, including improper techniques, inadequate preparation or contamination of the bonding surface. Contaminants that have been studied include saliva, blood, plasma, dental cements, caries-detecting dyes and irrigating solutions. The effects have varied depending on the contaminant and when the contamination occurred during the bonding process. Previous studies examining the effect of handpiece lubrication on shear bond strength to dentin have produced equivocal results, with some studies showing a decrease and others showing an actual increase. However, based on the results of this study, clinicians should have less concern about the influence of residual handpiece lubricant on dentin bond strength. Although it was not statistically evaluated in this study, it was interesting to note that although there was not a difference between the control group and handpiece combinations within each adhesive type, the one-step, self-etch adhesive had low bond strengths overall. Perhaps a bigger concern with bond strengths to dentin is not the possible contamination from the handpiece lubricants, but the selection of adhesive agent.

## References

1. Xie J, Powers JM, McGuckin RS. In vitro bond strength of two adhesives to enamel and dentin under normal and contaminated conditions. *Dent Mater* 1993;9:295-299.
2. Powers JM, Finger WJ, Xie J. Bonding of composite resin to contaminated human enamel and dentin. *J Prosthodont* 1995;4:28-32.